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**EXPEDITION OF THE CALIFORNIA ACADEMY OF  
SCIENCES TO THE GULF OF CALI-  
FORNIA IN 1921<sup>1</sup>**

**MARINE MOLLUSCA OF THE ORDER  
OPISTHOBRANCHIATA**

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This is the second paper<sup>2</sup> treating of the marine mollusks collected by the expedition sent to the Gulf of California in 1921 by the California Academy of Sciences. The greater part of the identifications and diagnoses have been prepared by the senior author, the efforts of the junior author having been largely confined to sundry comparisons, editorial work and the preparation of the illustrations.

We are indebted to Mr. A. M. Strong for assistance in arriving at some definite conclusion as to the nomenclature of some of the more difficult species.

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\* This is No. 35 of the series of Gulf Expedition papers.

<sup>1</sup>A map showing all the islands, etc., visited will be found in the General Account of this Expedition by Joseph R. Slevin, in these Proceedings, Vol. 12, No. 6, 1923, pp. 55-72; copies of this publication can be supplied at nominal cost.

<sup>2</sup>The first, treating of the Triphoridae by Fred Baker is found in Proc. Calif. Acad. Sci., 4th Ser., Vol. 15, No. 6, 1926, pp. 223-239, pl. 24.

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The differentiation of genera in this group of mollusks is unsatisfactory and our endeavor has been to place the following species in those currently recognized groups which have related forms; when geno-types are investigated, basic changes will possibly be required.

1. *Acteocina angustior* Baken & Hanna, new species

Plate 4, figure 5

Shell small, imperforate, very solid, narrowly cylindrical, with nearly parallel sides, everywhere marked by fine growth lines and minute, irregular, incised spiral lines; shining, whitish; nucleus small, but prominent, glassy, consisting of about one and a quarter planorboid whorls tilted to a nearly vertical position, and immersed in the succeeding postnuclear whorls not more than one-sixth of its diameter; postnuclear whorls about three, slightly convex, the upper nearly horizontal, the succeeding ones with an increasing downward slope; sutures channeled, slightly on the first whorl, deeply on the last, there producing a very prominent, sharp carina; spire rather short; aperture about four-fifths the length of the shell, beginning in a deep posterior notch formed by the channeled suture, the posterior half narrow, the anterior broadening into an elongate oval; outer lip sharp, beginning in the carina of the last whorl, sweeping downward with a moderate curve and continuing nearly straight to a point opposite the columellar fold and parallel with the inner lip for about two-fifths of the length of the shell, there joining the rounded basal lip; basal lip forming nearly a quadrant of a circle and joining the columella at about a right angle; columella only slightly curved, subvertical, twisted above to form a narrow, prominent spiral fold which disappears within the cavity of the shell; columella and columellar fold separated from the body of the shell by a rather broad, shallow groove also extending into the cavity of the shell; inner lip straight above, bounded below by the columellar groove, with a narrow callus which extends over the columella. Length, 5.4; diameter, 2.0 mm.

*Holotype*: No. 2513, Mus. Calif. Acad. Sci., with four paratypes dredged in from two to four fathoms in **Puerto Escondido, Lower California**.

This is the most common form of *Acteocina* found by the Expedition, having been taken, generally in the dredge, at La Paz, San Francisquito Bay, San Evaristo Bay, Coyote Bay in Concepcion Bay and San Luis Gonzaga Bay, Lower California, and on the following islands in the Gulf of California: Espiritu Santo, Carmen, and at three stations on San Jose. The species is very constant in shape, varying only in size and the height of the spire. Most specimens are more shining than the type and, in a considerable number, there is a suspicion of faint spiral banding in grayish, too indistinct to be definitely located. The spire is suggestive of *Acteocina culcitella* Gould, in the deep sutures and high carina, but the shell is much smaller, so far as known it has no epidermis and it is distinctly cylindrical instead of spindle-shaped as is *A. culcitella*.

### 2. *Acteocina carinata* (Carpenter)

*Tornatina carinata* CARPENTER, Maz. Cat., 1856, p. 171; type locality, Mazatlan, Mexico.

This species was taken in Tepoca Bay, Sonora; La Paz, Agua Verde Bay, San Evaristo Bay, and San Luis Gonzaga Bay, Lower California; and on Espiritu Santo, Carmen, Monserrate and San Jose islands in the Gulf of California.

### 3. *Acteocina inculca* (Gould)

*Tornatina inculca* GOULD, Proc. Zool. Soc. London, 1856, p. 203; type locality, San Diego, California. Distribution, "Monterey to Gulf of California." (Dall).

This species was taken in Tepoca Bay, Sonora; in Coyote and San Ignacio Bays in Concepcion Bay, and San Francisquito Bay, Lower California; and on Carmen, Sal si Puedes, Espiritu Santo and San Jose islands in the Gulf of California.

4. *Atys chimera* Baker & Hanna, new species

Plate 4, figure 4

Shell elongate-ovoid, shining, translucent, white, growth lines rather pronounced, especially towards the outer lip, with about nine incised spiral lines posteriorly and about sixteen anteriorly, separated by a narrow, clear space above the middle of the shell, the lines being unequally spaced and closer towards the extremities; obliquely truncate above, the apex narrowly, falsely umbilicate, the growth lines showing very plainly and dipping deeply into the cavity; aperture as long as the shell, showing a well rounded notch or posterior canal as the outer lip rises from the edge of the false umbilicus, narrow for the first three-fifths, then widening sharply; outer lip sub-angulate above, very moderately convex as it proceeds nearly parallel with the upper portion of the inner lip to join the basal lip which is sharply convex and slightly effuse; columella nearly straight below, sharply concave above, with a strong callus, reflexed to partially cover the deep and moderately large umbilicus and extending thinly over the lower portion of the inner lip. Length, 6.8; diameter, 3.3 mm.

*Holotype*: No. 2514, Mus. Calif. Acad. Sci., dredged in shallow water in **Puerto Escondido, Lower California**. Four young shells were dredged in about four fathoms off the main wharf at La Paz, and two others were taken in one to two fathoms in Coyote Bay, Concepcion Bay, all on the Gulf side of Lower California.

Carpenter's description of *A. casta*<sup>3</sup> is so vague and indefinite that identifications based thereupon would be entirely untrustworthy. *A. nonscripta* Adams<sup>4</sup>, a species ascribed to San Diego by Carpenter<sup>5</sup>, is much broader in proportion to length.

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<sup>3</sup> ?*Atys casta* CARPENTER, Ann. Mag. Nat. Hist., Ser. 3, Vol. 13, p. 314, 1864; Moll. Western N. A., p. 212.

<sup>4</sup> Thes. Conch., Vol. 2, 1850, p. 588, pl. 125, fig. 125.

<sup>5</sup> See Dall, Bull. 112, U. S. Nat. Mus. 1921, p. 62.

5. *Bullaria gouldiana* Pilsbry

*Bullaria gouldiana* PILSBRY, Man. Conch. Vol. 15, 1893, p. 340, pl. 36, figs. 22-24.

*Localities represented*

Pelican I.	Ceralbo I.
Sal si Puedes I.	Tepoca Bay
Isla Partida	Carmen I., Salt Works
Bellandra Bay, Carmen I.	Angeles Bay, L. C.
Agua Verde Bay, L. C.	San Luis I., Inner Lagoon
San Jose I., Salt Works	San Francisco I.
La Paz, L. C.	

6. *Bullaria punctulata* (A. Adams)

*Bulla punctulata* A. ADAMS, Thes. Conch., pp. 577, 604, pl. 123, fig. 77, 1850.

Specimens, mostly young, of this rather common species were taken at the following places on the Gulf side of Lower California: La Paz, Puerto Escondido, Coyote Bay in Concepcion Bay, San Evaristo Bay and San Luis Gonzaga Bay; on the following islands in the Gulf of California; Espiritu Santo, two stations, and San Jose, three stations.

7. *Cylichnella defuncta* Baker & Hanna, new species

Plate 4, figure 3

Shell very small, ovate-cylindrical, somewhat narrowed above, thin, smooth, except for minute growth lines showing over part of the surface; umbilical end with eight, apical end with seven distinct spiral lines; translucent-whitish; apex obliquely truncate, the apical lip only moderately elevated, peripherally umbilicate, showing about three distinctly convex whorls inside; outer lip thin, beginning at the edge of the apical umbilicus, rising very gradually to a subangulation at the upper, outer portion of the aperture, thence descending in a nearly straight, but slightly diverging line to a point slightly below the middle of the shell, from which point it rounds in a

gradually increasing curve into the broadly effuse basal lip; basal lip rounding rather sharply into the columella, producing a broad, prominent tooth; aperture as long as the shell, only slightly produced above, narrowest near the middle, elongate-subpyriform below; columella light, but rather broad, slightly revolute, somewhat reflexed but not covering the large and deep umbilicus; a moderate callus extending narrowly the length of the inner lip. Length, 2.6; diameter, 1.6 mm.

*Holotype*: No. 2515, Mus. Calif. Acad. Sci., and about twenty others were dredged in two to four fathoms in **Amortajada Bay, San Jose Island, Gulf of California**. Specimens were also taken off the Salt Works on San Jose Island and off Carmen Island, Gulf of California.

In some shells the columellar tooth, instead of being widened and rendered indistinct by the callus, is a rather narrow, ascending spiral fold formed by the continuation of the basal lip and sharply truncating the columella anteriorly.

The species somewhat resembles *Cylichna brevissima* A. Adams, from Chinese waters, but the Gulf species is proportionately narrower and lacks the central constriction.

#### 8. *Cylichnella fantasma* Baker & Hanna, new species

Plate 4, figure 6

Shell rather large for the genus, narrowly ovate-cylindrical, contracted at each end, everywhere marked by distinct growth lines and well marked incised spiral lines, the latter distinct and discrete at the extremities but more crowded and indistinct in the middle section, translucent white, slightly shining; apical umbilicus narrow, marked only by the entering growth lines; apical lip rising nearly vertically from the edge of the apical umbilicus for about three-fourths of a millimeter, then bending nearly at a right angle and continuing sinuously over the top of the aperture to join the outer lip, slightly effuse; outer lip thin and sharp, moderately and nearly evenly convex; basal lip somewhat fractured but evidently scarcely effuse and

nearly evenly rounded to join the columella without a fold; inner lip more convex than the outer, with a thin, narrow callus; aperture as long as the shell, narrowest towards the middle, wider opposite the apical umbilicus, narrowly subovate below; columella rather narrow and slightly twisted, concave, covered by a moderate callus which is obliquely truncate below, reflexed to partially hide the rather narrow umbilicus and spreading more broadly over the parietal wall. Length, 8.9; diameter, 4.0 mm.

*Holotype*: No. 2516, Mus. Calif. Acad. Sci., taken in **Isthmus Bay, Espiritu Santo Island, Gulf of California**; others were taken in San Gabriel Bay, Espiritu Santo Island and in San Luis Gonzaga Bay, Lower California.

The species somewhat resembles *Cylichnella attonsa* (Carpenter), but it has more convex sides, making it more spindle-shaped; the aperture extends farther above the apex, the basal lip is more narrowly rounded, the incised spiral lines are much more distinct, and the peculiar angulation near the beginning of the apical lip, which is more or less discernible in most of the specimens taken, is wanting in *C. attonsa*.

#### 9. *Haminoea angelensis* Baker & Hanna, new species

Plate 4, figure 1

Shell very thin and fragile, translucent, grayish-yellow, globose-oval, bullæform, only slightly narrowed above; surface sculptured with faint growth lines and showing minute, wavy, microscopic, spiral, incised lines which are rather more distinct and discrete towards the base; vertex narrowly and shallowly impressed but not umbilicate; lip arising near the center of the apical depression, slightly revolute as it passes upward and outward to the slightly effuse apical lip, curving quite abruptly into the outer lip; curve of the outer lip increasing regularly downward until it passes into the nearly circular basal lip; columella very slightly folded above, rather strongly curved, with a heavy, reflexed callus forming a long, narrow



umbilical chink and extending over the whole of the inner lip; aperture narrow above, very broad below. Length, 7.2; diameter, 5.6 mm. A broken shell taken in the same dredge haul as the type measures: length, not less than 12 mm.; diameter, 8.3 mm.

*Holotype*: No. 2517, Mus. Calif. Acad. Sci., was dredged in from four to six fathoms in **Angeles Bay, Lower California**, on the so-called "Sea Lettuce"; several others were taken at the same locality and single specimens were taken at San Luis Gonzaga Bay, and in Coyote Bay, Concepcion Bay, Lower California. Other localities are Ensenada de Santa Teresa, Monserrate Island; San Francisquito Bay and Isthmus Bay, Epiritu Santo Island.

The small size and color readily distinguish the species from *H. vesicula* Gould of the west side of Lower California. When the periostracum is removed the shell is thin and delicate, translucent-white, and shows the spiral striations very distinctly. The young shells show the growth lines and spiral incised lines more distinctly than mature individuals. *H. cymbiformis* Carpenter is an indeterminate species described from a very minute unique specimen. *H. angelensis* differs from all other species of *Haminoca* described from this coast in the breadth of the upper portion, which gives it the facies of a *Bullaria*.

#### 10. *Haminoca strongi* Baker & Hanna, new species

Plate 4, figure 2

Shell pale green when covered with epidermis; marked with distinct growth lines and exceedingly fine spiral striations; apex depressed but not umbilicate; aperture greatly expanded and longer than body whorl; outer margin of body whorl rounded, tapering to a somewhat acute apex but without a compound, concave curve; parietal wall heavily covered with a deposit of white testaceous material which is rough and more or less completely covered with small conical projections. Length, 14.1; diameter, 10.2 mm.



*Holotype*: No. 2518, Mus. Calif. Acad. Sci. from **San Esteban Island, Gulf of California**; collected by Fred Baker, 1921 Expedition.

This species was found abundantly in the Gulf, the following localities being represented:

San Esteban Island	Georges Island
Granite Island	Isla Raza
Coronados Island	Sal si Puedes Island
Tepoca Bay	Los Animas Bay
San Luis Gonzaga Bay	San Luis Island
San Marcos Island	Angel de la Guardia Island
Puerto Refugio	Guaymas Bay

The relationship of the species is clearly with *H. virescens* Sowerby and what has passed under that name from the west side of Lower California but the validity of which is to be doubted. Thus, shells from San Diego are very much larger, have larger body whorls, proportionately, and, most important of all, the outer boundary of the body whorl has a decided compound curve as the apex is approached, one portion being definitely concave; this latter is true to probably a greater extent in the true *H. virescens*.

#### 11. *Retusa gonzagensis* Baker & Hanna, new species

Plate 4, figure 8

Shell very small, rather broadly cylindrical, the right side straighter than the left, slightly narrowed above, dull white, scarcely shining; sculpture limited to irregular growth lines and a few incised spiral lines about the base; apex almost horizontally truncate, with a narrow umbilicus nearly filled by the callus of the inner lip; outer lip beginning in the apical callus, not effuse above, rising but slightly and rounding broadly into the vertical portion which is nearly straight for fully half of the length of the shell, extending in a gradually increasing curve into the basal lip; basal lip scarcely effuse, moderately rounded throughout most of its course, then bending up sharp-

ly to form a prominent, heavily calloused, ascending spiral fold; inner lip very slightly more convex above than the outer lip, the curve increasing gradually below, covered throughout by a very heavy callus extending over the parietal wall to join that of the columella, and sharply defined in a nearly straight line on the body whorl; aperture as long as the shell, with nearly parallel sides and moderately open above, subpyriform below; columella strongly curved, defined above and below by heavy ascending and entering spiral folds, the whole covered by a very heavy, broad, slightly concave callus defining a long, shallow umbilical chink. Length, 2.9; diameter, 1.6 mm.

*Holotype*: No. 2519, Mus. Calif. Acad. Sci., dredged in shallow water with five smaller shells, in **San Luis Gonzaga Bay, Lower California**.

The species is definitely marked by the slight obliquity of the apex, and by the peculiar columella with two widely separated spiral folds and the broad, concave callus distinctly raised above the level of the inner lip and parietal wall. All of these criteria are well defined in all of the specimens taken. The writers have seen no figure or shell which closely resembles it.

## 12. *Retusa paziana* Dall

Plate 4, figure 7

*Retusa paziana* DALL, Proc. U. S. Nat. Mus., Vol. 56, 1919, p. 297, unfigured.

Specimens of this species were dredged in rather shallow water in Puerto Escondido and San Luis Gonzaga Bay, Lower California, and in Amortajada Bay, San Jose Island, Gulf of California.



## PLATE 4

- Fig. 1. *Haminoea angelensis* Baker & Hanna, new species. *Holotype*; No. 2517 (C.A.S.) from Angeles Bay, Lower California; length, 7.2 mm.; p. 129.
- Fig. 2. *Haminoea strongi* Baker & Hanna, new species. *Holotype*; No. 2518 (C.A.S.) from San Esteban Island, Gulf of California; length, 14.1 mm.; p. 130.
- Fig. 3. *Cylichnella defuncta* Baker & Hanna, new species. *Holotype*; No. 2515 (C.A.S.) from Amortajada Bay, San Jose Island, Gulf of California; length, 2.6 mm.; p. 127.
- Fig. 4. *Atys chimera* Baker & Hanna, new species. *Holotype*; No. 2514 (C.A.S.) from Puerto Escondido, Lower California; length, 6.8 mm.; p. 126.
- Fig. 5. *Acteocina angustior* Baker & Hanna, new species. *Holotype*; No. 2513 (C.A.S.) from Puerto Escondido, Lower California; length, 5.4 mm.; p. 124.
- Fig. 6. *Cylichnella fantasma* Baker & Hanna, new species. *Holotype*; No. 2516 from Isthmus Bay, Espiritu Santo Island, Gulf of California; length, 8.9 mm.; p. 128.
- Fig. 7. *Retusa paziana* Dall. *Plesiotype*, No. 2520 (C.A.S.) from Espiritu Santo Island, Gulf of California; originally in the collection of Fred Baker; length, 2.3 mm.; p. 132.
- Fig. 8. *Retusa gonzagensis* Baker & Hanna, new species. *Holotype*; No. 2519 (C.A.S.) from San Luis Gonzaga Bay, Lower California; length, 2.9 mm.; p. 131.

